



Activity Report 119

Urban Environmental Health Strategies Three Community-based Environmental Sanitation and Hygiene Projects Conducted in the Democratic Republic of Congo

by

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Abbreviations

ACF	Action Against Hunger (Action Contre la Faim)
ADIR	<i>Association pour le développement intégral en milieu rural</i>
CBO	Community-Based Organization
CEBAB	<i>Cellule de base pour l'assainissement de Barumbu</i>
CESH	Community-based Environmental Sanitation and Hygiene
CNAEA	<i>Comité national de l'eau et de l'assainissement</i>
DRC	Democratic Republic of Congo
EHP	Environmental Health Project
ESP	University of Kinshasa School of Public Health (<i>Ecole de santé publique</i>)
FOLECO	<i>Fédération des ONGs laïques à vocation économique</i>
HET	Health Education Team
IEC	Information, Education, Communication
INADES	<i>Institut national pour le développement et études sociales</i>
IRC	International Rescue Committee
KAP	Knowledge, Attitude, Practice
MAPET	Manual Pit Latrine Emptying Technology
NGO	Non-Governmental Organization
ONG	<i>Organisation non-gouvernementale</i>
OTI	Office of Transition Initiatives
PNA	<i>Programme national d'assainissement</i>
REGIDESO	Régie de distribution des eaux de la République du Congo
RUDO	Regional Urban Development Office
SANRU	USAID Rural Health Bilateral Project

USAID	United States Agency for International Development
WHO	World Health Organization

Executive Summary

The United States Agency for International Development mission in the Democratic Republic of Congo (USAID/DRC) collaborated with the Environmental Health Project (EHP) and the Regional Urban Development Office (RUDO) at USAID/South Africa to develop and implement an Urban Environmental Health Strategy. From October 2000 through January 2002, three pilot projects were supported in the DRC that were consistent with this strategy and improved the living conditions in two cities in the country. This document reports on the design, implementation, impacts and lessons learned from these three projects.

Context

In 2000, it was estimated that the 52 million people living in the DRC were saddled with a public external debt that was ten times the annual value of their total national exports of goods and services. During the past 40 years, the per capita income in the country dropped from US\$ 361 to below US\$ 100, leaving 80% of the population in absolute poverty. During the same period, the population grew at nearly 2% per year, while continuing to experience a high infant mortality rate—even for sub-Saharan Africa. What's more, 34% of children under the age of five were malnourished, over one million people were living with HIV/AIDS, nearly the same number of children had been orphaned by AIDS, and the prevalence of diarrhea in urban-dwelling children under the age of five was between 20%–25%.

Civil war pitted the national government against rebel forces. Mobility in the country was severely limited and at best difficult. Joseph Kabila became the president of the DRC at age 31 in 2001.

Urban areas in the DRC were in particular crisis as a result of rapid growth, unplanned, even anarchic settlement practices and poor management of public services. These factors led to disastrous consequences, including the degradation of the urban environment, the decay of infrastructure and the deterioration of public health. High rates of water-borne diseases resulting from these conditions led to numerous cases of typhoid fever, dysentery, cholera, and diarrhea in urban centers around the country

Rationale for Action

In the 1990s, USAID/DRC worked principally in a humanitarian response mode. The magnitude of the health crises and the reality of a country divided by conflict limited the areas where the mission could implement programs. At the time, the severity of the urban crisis, the ability to access urban areas and the desire on the part of mission staff to initiate forward-looking, community-based development led USAID/DRC toward a focus on urban environmental health programming. Work began with the

preparation of an Urban Environmental Health Strategy paper in June 2000. Subsequently, short-term, results-oriented pilot projects were implemented that were consistent with that Strategy. USAID/DRC support to three pilot projects began in October 2000.

Two international NGOs with Congolese experience—Action Against Hunger and the International Rescue Committee—collaborated with local community-based organizations to implement comprehensive environmental health projects aimed at preventing diarrheal diseases. These projects ranged from ten to 15 months in duration and were implemented in three urban settings:

- public markets in Kinshasa (the DRC capital)
- the secondary city of Kananga (in Western Kasai province)
- the Kinshasa *commune* (ward) of Barumbu.

The University of Kinshasa's School of Public Health provided valuable training assistance to community educators and conducted baseline, midterm and final impact survey evaluations. The key findings from these studies are found in Annex 2.

Pilot Project Objectives and Results

ACF Kinshasa Markets Water and Sanitation Project

The primary goal of this project was to reduce public health hazards by improving sanitary conditions and local management in Kinshasa's open-air markets. Its main objectives were:

- build community management capacity and improve hygiene practices
- improve sanitation facilities
- increase the availability of safe drinking water.

Even with a modest budget, the accomplishments of this short-term pilot project were impressive. From an infrastructure perspective, the project resulted in:

- the construction of nine sanitation units connected to municipal water supply
- the construction of 11 water distribution points connected to municipal water supplies
- the management by local organization of the sanitation units and water distribution points in each of the seven targeted markets.

In terms of advancing health awareness and self-improvement within the community, the ACF project facilitated:

- the focus by the populations using these markets on hygiene issues in their environment and increased awareness of their ability to organize to correct problems
- the propagation of sound hygiene behavior messages.

Quantitative analysis of improved hygiene practices and their effect on reducing diarrhea in children was too mixed to draw any valid conclusion. For example, in one market neighborhood, a dramatic reduction in diarrhea prevalence in children under five was detected (from 25% to 12%) and an increase in healthy practices such as proper disposal of garbage, use of latrines and proper hand and utensil washing and drying was noted. However, in another market, an increase was seen in diarrhea among children under five (from 7.7% to 15.1%) along with a decrease in the proportion of the population using hygiene practices. These varied results most likely can be attributed to variables beyond the scope of the intervention rather than to the efficacy of the pilot project itself.

The most noteworthy achievement of the ACF project was the collaboration with the market vendors in educating and mobilizing their communities to address their own sanitation needs and in so doing, bringing about visible improvements.

The IRC Kananga Water Supply and Hygiene Education Project

Conceived as a six-month pilot project and later extended to 15 months, this project's goal was to reduce the incidence of morbidity and mortality caused by water-borne diseases by increasing local capacity in water provision and management, promoting preventive health measures and increasing access to potable water.

The project's three initial objectives were to promote better health and hygiene practices, to increase the quantity and improve the quality of household water, and to improve the sustainability of water-supply facilities. With the extension of the project, two more specific objectives were added: improving the sanitary conditions of the Kananga central market; and providing water to a mission/village 30 miles from Kananga.

The project met its primary objectives, and it resulted in:

- the construction and/or protection of 76 accessible clean water supply sources
- the construction of four large-capacity water storage tanks and four public fountains connected to the municipal water supply
- water control and construction of a storage tank in a neighboring town

- the improvement of infrastructure in the Kananga central market.

The project has led to the provision of safe, potable water to over 30,000 people each day.

In terms of self-management and health awareness within the community, the IRC project facilitated:

- the strengthening of local technical and management skills
- the propagation of sound hygiene behavior messages.

A final project survey revealed an increased exposure to hygiene lessons and awareness of healthy practices. However, the quantitative analysis did not demonstrate either a significant change in habits or a reduction in childhood diarrhea for several possible reasons. First, one year may be too short a time frame to register significant changes. Second, two different methods of collecting data were used and did not cover the same population.

The project's most notable achievements were in the growth of protected potable water sources within walking distance of homes and in the initiation of micro-enterprises to maintain these sources.

IRC Barumbu Environmental Health Pilot Project

This 15-month project tapped into the existing capacity for community self-organization by collaborating with a local community-based organization and local governmental and clerical organizations in sensitizing and mobilizing the population. The overall goal of the IRC intervention was two fold: to reduce the incidence of diarrheal diseases by working with the community to eliminate various vectors found in the environment and to identify and test creative solutions and alternative techniques to address urban environmental health problems.

The project's activities were designed around four objectives:

- building the capacity of the community to identify and address their own sanitation needs
- improving wastewater management and drainage
- increasing sanitation facility use
- improving domestic and community hygiene practices.

As a pilot program, the IRC Barumbu project demonstrated what can be done in a short time by working with and strengthening community partners. From an infrastructure perspective, the project introduced the Manual Pit Latrine Emptying

Technology (MAPET) pump combined with wetlands to empty domestic latrines, built public latrines in markets, financed the purchase of push carts to evacuate solid waste and increased the efficiency of the existing drainage network. All these initiatives are sustainable and should generate income for local providers.

In terms of hygiene education, the project succeeded in training multiple community educators to sensitize the population by propagating messages through print materials, live performances and public gatherings and, to some extent, through radio and television.

Analysis of survey results showed an increased awareness and shift in hygiene behaviors in the project area. Forty-six percent of the population surveyed in the post-intervention study linked diarrhea to sanitation, compared to 6.8% before the project. The percentage of households surveyed using clean containers for water storage increased from 49.2% to 80.3%, the percentage of households surveyed covering pit latrines from 7.3% to 16%. The percentage of households using garbage cans and paying push carts to remove garbage also increased noticeably. Results on the reduction of childhood diarrhea were inconclusive.

The most significant accomplishment of the Barumbu project was the active participation of the community in the activities, their willingness to pay for the garbage collection services and MAPET emptying of pit latrines and their desire to continue the activities.

Ultimately, the Kinshasa Markets, Kananga, and Barumbu projects proved highly successful in terms of community mobilizing, infrastructure improvement and community self-management. Their success as public health endeavors appeared significant in qualitative research, but could not be quantitatively proven because of the limits to both the surveys and the projects themselves, and the short time span and scope of the interventions in relation to the multitude of environmental health problems. However, preliminary results indicate that if the pilot projects were funded as long-term projects, public health benefits would become apparent in both quantitative and qualitative analyses.

Lessons Learned

The lessons learned from the three pilot projects were documented by the Environmental Health Project. The principal findings of that document are listed below and are elaborated upon in the text of this document.

Lessons Learned About Program Design and Flexibility

- Project proposals must be written based upon a thorough understanding of the situation in the field.
- A formal start-up workshop bringing together implementers and primary stakeholders is beneficial in project implementation.

- The program plan must be well-structured to allow for improvements not stipulated in the original design. The implementers should be able to make subsequent budgeting reallocations with the approval of immediate supervisors.

Lessons Learned About Information, Education, Communication (IEC) and Hygiene Behavior Change

- Training and equipping community motivators/peer educators is crucial to the accomplishment of hygiene behavior change.
- Comprehensive baseline surveys focused on targeted behaviors are important for both planning IEC and training as well as for documenting health impacts.
- Multiple modes of communication should be used in implementing behavior change activities.

Lessons Learned About Strengthening Local Partners and Community Ownership

- Sufficient time must be set aside at the beginning of implementation to understand and train local partners, including government and community-based organizations.
- Comprehensive market sanitation projects should be implemented by following the same steps as comprehensive community development projects.
- Local partnership activities should not be confined to a single partner. Establishing community ownership is critical to success.

Lessons Learned About the Financial Sustainability of Interventions

- One year is too short a time period to accomplish a pilot intervention and ensure its long-term sustainability.
- Income can be generated by community-based water and waste management organizations.
- For income generating projects related to infrastructure management, a targeted amount of funds should be mandated to be set aside to cover recurring capital costs.
- In micro-enterprise building, strong efforts should be made to ensure that collected fees retain their value over time.

Lessons Learned About Survey Evaluations and Follow-up

- The incorporation of local institutions such as the School of Public Health can positively serve the implementation as well as the evaluation of a community-based project.
- Indicators used and the feasibility of methods must be realistic. Methods of data gathering also must be consistent.
- Follow-up on initiated activities is essential to their long-term sustainability.

Conclusion

Traditional approaches to improving water supply and sanitation in markets and communities in cities in developing countries typically focus on solid waste management and water supply but do not emphasize health improvement. In the Democratic Republic of Congo, USAID/DRC, ACF, USAID/RUDO, IRC and the Environmental Health Project chose a more innovative direction to reduce diarrheal disease by focusing on improving infrastructure and behaviors and on their sustainability. The results provide clear evidence of the success of this approach. The lessons learned were gained from three specific activities, but they are general enough to guide the design and implementation of other similar activities in different settings. It is apparent from the findings that improving sanitation and hygiene behaviors in markets and communities in sub-Saharan Africa can be a viable approach to improving urban health using focused, cost-effective and financially sustainable programming. It is hoped that similar efforts will be supported, evaluated, documented and discussed.

1. Introduction

1.1. Overview

In June 2000, the USAID mission in the Democratic Republic of Congo (USAID/DRC) in collaboration with the Environmental Health Project (EHP) and the Regional Urban Development Office (RUDO) at USAID/South Africa developed the Urban Environmental Health Strategy that would apply to three pilot projects in the DRC. From October 2000 through January 2002, two international NGOs with Congolese experience—Action Against Hunger (ACF or *Action contre la faim*) and the International Rescue Committee (IRC)—collaborated with local community-based organizations (CBOs) to implement water and sanitation improvement projects ranging in duration from ten to 15 months in three Congolese urban settings:

- public markets in the DRC capital, Kinshasa
- the secondary city of Kananga (in Western Kasai province)
- the Kinshasa *commune* (ward) of Barumbu.

The pilot projects addressed problems of water supply, hygiene education and sanitation improvement. The University of Kinshasa's School of Public Health (ESP or *Ecole de santé publique*) provided valuable training assistance to community educators and conducted baseline, mid-term and final-impact survey evaluations. The EHP, USAID/DRC, ESP and the implementing NGOs monitored and evaluated the outcomes of the projects. The key findings of these studies are presented in Annex 2.

Focused principally on preventing childhood diarrhea and based on a strategy of sustainable development and local community participation—where the active stakeholders on the ground also benefit from and should continue the practices in the long term—these pilot projects fall under the broad umbrella of Community-based Environmental Sanitation and Hygiene (CESH). Coupled with the dual goals of improving domestic and community hygiene practices and increasing water supply and sanitation facility usage were two additional goals: local management and generation of income among local providers who would continue to ensure the viability of small-enterprise hygiene facilities, waste management and water supply sources.

1.2. The DRC Context and Urban Environmental Health Crisis

Despite its inordinate mineral wealth and food production potential, the DRC remains one of the lowest per-capita income countries in the world (rated at less than US\$ 100 in 2000). This country is a dramatic example of the scars left by the former colonial empire and the failure of the post-colonial state to meet the minimum needs of its citizens.

After more than a century of European colonial exploitation, the DRC (formerly the Republic of Zaire) experienced nearly three decades of the oppressive Mobutu regime. In a popularly heralded and relatively bloodless revolution, Laurent Kabila came to power. After his assassination in 2001, his son, Joseph Kabila, assumed leadership. He inherited a vast country plagued with a host of problems including:

- an inadequate and crumbling infrastructure
- a civil war that has pitted the new regime's forces—supported by Angola, Namibia, and Zimbabwe—against rebels backed by Uganda and Rwanda
- an external debt that amounts to ten times the value of the country's annual export of goods and services
- severe poverty, which affects 80% of the population
- widespread malnutrition and disease, including vaccine-preventable outbreaks, malaria, HIV/AIDS, water-borne diseases such as typhoid fever and cholera, dysentery and diarrheal disorders, acute respiratory infection, tuberculosis and other infectious diseases.

Nowhere are these problems more acutely experienced than in the cities of the DRC. Despite their lack of infrastructure and inability to provide adequate services to its inhabitants, Kinshasa and other Congolese urban centers have continued to lure people from the rural areas. Originally developed to handle a population of about one million, Kinshasa's population, for example, has grown to an estimated six million people. Because of insufficient funds and poor management, the municipal governments in these urban areas cannot begin to meet the demands of waste evacuation, sanitation, and adequate washing and safe potable water supply. Although the urban communities might understand the need for elementary hygiene and clean drinking water, they lack the means to procure basic services either on their own or from failing national or municipal services.

Unhealthy conditions prevail in the residential, commercial and industrial areas of the DRC urban centers. This situation results from overall poor management of urban resources and the inability of public services to control the continuing exodus from rural areas, manage population growth and develop coherent programs in the areas of

sanitation and environmental health. These unhealthy conditions result from many things including poor housing, the lack of sanitation and waste treatment facilities, the lack of potable drinking water in most residential areas, the uncontrolled proliferation of disease vectors, basic insecurity and safety concerns, and air and water pollution.

The impediments to improving most or all of these conditions encompass a range of institutional, financial, technical and regulatory issues.

1.3. The Status of Urban Environmental Health Sectors

Urban environmental health is a multi-faceted sector that requires input and action from a number of technical and social players. The umbrella of urban environmental health covers sanitation facilities, potable water supply, roads and drainage, wastewater management and public health. Below is a brief review of the status of each sector in the urban and peri-urban areas in the DRC in 2000 at the time when the pilot projects were initiated.

Nationally, the various sectors have been under the general coordination of the *Comité National d'Action de l'Eau et de l'Assainissement* (CNAEA). Responsibility for provision of services varies somewhat from one urban area to another, but enough consistency of providers exists to allow a general presentation of the roles and capacities of lead actors in each sector.

1.3.1. Environmental Sanitation

Principal components of this sector include solid waste management and domestic hygiene. The sector is in a lower state of development than some of the others although significant attention is being given to its strengthening and organization. No single urban authority exists to address the needs of this sector, and authority is divided among a number of organizations including the national governmental organization, municipal authorities and non-governmental organizations.

Because of the capital's large population, Kinshasa's solid waste disposal is an important issue. However, a coherent broad-based approach to solid waste management does not exist. Theoretically, the *Programme national d'assainissement* (PNA) ensures cleanliness and the removal of solid waste including authorized and unauthorized disposal points. In fact, the collection of waste actually falls on non-governmental or private initiatives. Because PNA cannot meet the demands of residential areas, and even less of industrial areas, a variety of individual or community-based solutions have emerged.

The numerous households of the capital constitute a major source of environmental pollution. Garbage and fecal sludge are regularly disposed in any location without concern for the possible impacts on the environment and the population's health, in

part because of the absence of public disposal points and regular evacuation services. Another reason is the apparent lack of awareness by householders of the link between hygiene and disease prevention including the negative impacts that unhygienic behaviors—such as improper storage of drinking water, neglect in handwashing, and indiscriminate excreta disposal—have on their family's and community's health.

1.3.2. Potable Water Supply

There is only one official provider of drinking water in urban areas of the DRC: the REGIDESO (*Régie de distribution d'eau de la République du Congo*). This state enterprise has exclusive responsibility for the exploitation, maintenance and provision of drinking water throughout the DRC. In 1990, 82% of the total water provided by REGIDESO was sold in Kinshasa. Since 1989, the organization has been unable to meet the demand for water in any urban area, and little if any infrastructure expansion has occurred since then. Budgetary restrictions and the magnitude of the bureaucratic network impede the improvements needed to increase the regularity of pressurized water delivery.

Despite this challenge, tap water samples of the REGIDESO supply are of acceptable quality. Residual chlorine concentrations are typically quite low and bacterial contamination of the samples is virtually non-existent (Mbela et al. 1996, 1999). In 1999 the University of Kinshasa School of Public Health conducted an evaluation of the tap water quality provided by REGIDESO in three of Kinshasa's urban communes: Kisenso, Kimbanseke and N'djili (Mbela et al. 1999). No trace of residual chlorine was found in 28% of the samples, and only 1% of tap water samples yielded positive results for fecal coliform, a reliable indicator of fecal contamination of water supply.

1.3.3. Roads and Drainage

Theoretically, each city has the responsibility for operating local roads and drainage. In reality, the national *Office de Voirie et Drainage* is expected to cover all areas including the principal drainage networks. This organization, in cooperation with the *Office des Routes*, is also responsible for the roads of national interest.

For the past 30 years, as a result of lack of maintenance, the state of urban roads and drainage has been continuously degraded. The drains are blocked and the roadways are heaped with garbage. The surface water drainage networks constructed in the residential areas do not function, resulting from the absence of maintenance facilities and any meaningful sanctions against people who block the collectors by disposing their waste in the drains. While this situation improves somewhat in the rainy season, the consequent erosion and flooding lead to other health hazards, the loss of human lives and the destruction of important structures. All of this results from the absence of an urbanization plan and minimal direction regarding the drainage system.

1.3.4. Wastewater Management

This sector is concerned with the discharge of wastewater from municipal and individual installations. The situation in Kinshasa is typical of urban areas in the country. There is a limited collection system at best, and there is no treatment at all before disposal of the wastewater to surface water bodies. In Kinshasa, wastewater is disposed in the Congo River. The network in the central area of the city totally lacks maintenance and is practically unusable. The network for rainwater disposal in the center of the city was transformed into a combined sewer by illegal connections of wastewater. It functions poorly, but wastewater does flow. In other locations, rainwater is diverted to the rivers that usually serve as the supply of potable water for urban populations. These rivers traverse the metropolitan areas and serve as the primary evacuation sources of rainwater. Over time, as the streams are transformed into public discharge points, and as the rains wash away rubbish and pollution from certain areas, the flowing waters arrive in the lower-lying, more densely populated urban areas to compound already poor environmental conditions.

City authorities, possibly with the assistance of the state represented by PNA, have the responsibility for wastewater management. This includes the responsibility of emptying domestic latrines. For this service, PNA charges a fee that is based on the distance that must be traveled during emptying. A typical fee for 5 mm³ of waste and a traveling distance of 10 miles is 1,000 Congolese Francs (approximately US\$ 40 at the year 2000 prevailing official exchange rate).

1.4. The Challenge of Community-based Projects

Although the population has become accustomed to living with these conditions, they have also shown great initiative in improving them. The Congolese people have demonstrated remarkable resiliency both in adapting to difficult situations and in inventing grassroots directed solutions, ranging from small individual initiatives to entire community mobilizations. As a whole, the population has amply demonstrated a will to improve its conditions. However, decades of governmental neglect and exploitation have created a climate of mistrust and sometimes of apathy, which is a constant challenge to any community-participation development program.

On the one hand, development agencies can rely on a local community's willingness to actively participate in its self-improvement. On the other hand, they must deal with suspicion of their intentions, mistrust within the community itself and toward the governmental hierarchy.

The first key decision facing USAID/DRC concerned where to begin to address the wide range of problems and how to enlist the communities in their own self-improvement. The Kinshasa USAID mission, in partnership with RUDO and EHP,

established the groundwork of the Urban Environmental Health Strategy that would be applied in the three results-oriented pilot projects described in this document.

1.5. Organization of This Report

The second chapter of this report describes the overall concepts and priorities of the Urban Environmental Health Strategy in responding to the crisis, the selection of the intervention sites and the agencies that would implement the three DRC pilot programs, the start-up workshop preceding the field work, and the impact evaluation methods and indicators.

The third through fifth chapters document the activities and achievements of the three pilot projects. Chapter 3 focuses on the ACF Kinshasa market water and sanitation programs, Chapter 4 on the IRC Barumbu waste management and hygiene education program, and Chapter 5 on the IRC Kananga water supply and hygiene education program.

The sixth and final chapter outlines the achievements of the three pilot projects and the lessons learned.

2. The Urban Environmental Health Strategy

2.1. USAID/DRC Response to the Crisis

After a realistic assessment of conditions, USAID/DRC established an intermediate result program directed at addressing high-risk, urban environmental health issues. To initiate the work, the mission supported the development of an Urban Environmental Health Strategy in cooperation with USAID's Environmental Health Project, based in Alexandria, Va., the Regional Urban Development Office at USAID/South Africa, based in Pretoria, and the University of Kinshasa School of Public Health. This Strategy would apply to specific short-term, result-oriented projects implemented by NGOs with Congolese experience, comply with the DRC government public health policies, address the immediate needs in a given population to alleviate shortages in service provision, and offer lessons to be incorporated into future environmental health activities in the DRC.

The Urban Environmental Health Strategy (McGahey 2000) developed by USAID/DRC, EHP, and RUDO was closely consistent with the objectives and planned actions of a number of municipal and national DRC governmental entities. Their objectives included providing urban drinking water and a national sanitation program involving the Ministry of Health and the municipality of Kinshasa. The Strategy was also consistent with USAID/DRC's focus on reducing threats to health from environmental factors.

The framework established in the Strategy defined the following objectives:

- Increase access to adequate environmental services
- Increase access to water and sanitation in focus areas
- Improve urban waste management
- Increase environmental awareness and advocacy.

The Strategy also stipulated the following guiding principles:

- Cost-effective best practices should be replicated

- Strong African organizational partners should be used to the maximum extent possible
- Cooperation with other donors and regional organizations should be maximized
- Community involvement in the provision of environmental health services should be central to all activities
- Income generation should be stimulated to address long-term poverty issues
- Innovative methods to address the needs of populations at high risk of HIV/AIDS infection should be identified and supported
- Interventions and evaluations should be scientifically based
- Initiatives should demonstrate financial sustainability.

Within this set of principles, eight components of the Strategy were identified and developed through discussions with multiple stakeholders in the DRC. The primary components were:

1) Community participation:

- to strengthen the role played by community members in planning, decision making, prioritization, implementation, monitoring and evaluation of activities

2) Behavior change:

- to maximize health improvement by supporting improved household-level hygienic behaviors

3) Addressing targeted priorities:

- to optimize the use of available resources by focusing on overcoming selected, high priority environmental health risks rather than attempting to broadly address a wide range of issues

4) Decentralization of municipal service delivery:

- by facilitating the formation of cooperative structures where community organizations assist municipal organizations in providing environmental sanitation services to their constituents

5) Microenterprise support for environmental sanitation improvement:

- to encourage formation of new relationships between the public and private sectors to generate financially sustainable improvements in urban environmental health

- 6) Cooperation with existing health facilities:
 - to ensure that environmental health improvements are consistent with and supported by health care delivery networks and their community-based organizations
- 7) Information, Education, Communication (IEC) and Training:
 - to increase knowledge and change behaviors through IEC and training focused on addressing targeted priorities
- 8) Alternative Techniques of Environmental Sanitation Improvement:
 - to support expanded use of proven innovative and alternative community-applicable technical interventions to improve environmental sanitation.

Although none of these components was new to DRC urban environmental health projects, this was the first program that would encompass all eight components. Ultimately, their application in specific sites resulted in significant changes in the environmental health status of the targeted communities.

2.2. Identifying NGO Implementers and Intervention Sites

USAID/DRC and EHP committed to supporting the design and implementation of three urban environmental health pilot projects. After a limited competitive solicitation of proposals, those from international and local NGOs were reviewed with an eye toward creating essential rather than merely cosmetic changes in the communities. In September 2000, cooperative agreements were signed with ACF and IRC to begin implementation in October 2000. The pilot projects described in this report have been arranged according to their completion and final impact evaluation dates by the University of Kinshasa School of Public Health and the implementing NGOs:

1. ACF was to work on a water, sanitation and education project in seven of Kinshasa's public markets, which were chosen because they were representative of the socio-economic realities of the municipality and because of the feasibility of implementing the program (a ten-month project to be completed in August 2001, with ESP evaluation in September 2001).
2. IRC was to work on a water supply and hygiene education project in Kananga, a secondary city in Western Kasai province (originally a six-month project was extended to 14 months for completion in December 2001, with ESP evaluation in November 2001).

3. IRC was to work on a hygiene education and sanitation project in the Kinshasa commune of Barumbu (a 15-month project was to be completed and evaluated in January 2002).

2.3. Start-up Workshop

Although the two international NGOs had significant experience in the DRC, they did not have the full range of skills needed to address all components of a CESH project as set out in the Urban Environmental Health Strategy. In addition, most members of the project teams had never worked together. Therefore, RUDO supported EHP's organization of a four-day start-up workshop involving key implementers and stakeholders of the three pilot projects.

Held in Kinshasa, Oct. 2–13, 2000, the workshop was conducted by EHP Coordinator of Community-based Programs, Christopher McGahey, who had been the lead author of the Strategy, Dr. Kisi Mundiete, who facilitated the workshop, and Dr. Kiyombo Mbela, who would direct the ESP surveys. All three worked closely with the Baudouin Kutuka, the USAID/DRC program officer.

The workshop's objectives included:

- encouraging the participants to share information about their respective projects
- developing work and monitoring plans for each project
- agreeing upon and committing to each project's goals and activities as well as to specific roles and responsibilities
- developing strategies that would address the most important issues of each project.

2.4. Monitoring and Evaluation

The methods of monitoring and evaluating the impact of the three projects included:

- regular reports from the implementing NGOs throughout the field activities
- focus group discussions and individual interviews with the community stakeholders
- on-site visits by EHP and ESP representatives
- Knowledge, Attitude, Practice (KAP) surveys, rapid assessment surveys and quantitative analysis of the data by ESP.

In August 2001, the EHP representative conducted a third technical assistance visit to the DRC to evaluate the results of the projects measured against the main components of the Strategy and the original proposals of the two NGOs in order to assess accomplishments and to glean lessons for future Urban Environmental Health projects (McGahey, August 2001).

The University of Kinshasa School of Public Health would conduct the quantitative analyses of the three projects comparing findings of the baseline KAP study done at the start of each project, any mid-term studies they conducted, and the impact study after completion of the activities. EHP and ESP set up the criteria of evaluation and the indicators of change.

The USAID Food and Nutrition Technical Assistance Project (1999) includes a *Water and Sanitation Indicators Measurement Guide* for use by NGOs and USAID in monitoring and evaluating activities. The Guide uses four impact indicators that were adapted to the DRC pilot programs as follows:

- percentage of children under five with diarrhea in the preceding two weeks
- quantity of water used per capita per day
- percentage of child care givers and food preparers with appropriate handwashing behavior
- percentage of the population using sanitation facilities.

These indicators served to focus the pilot intervention plans on actions to reduce diarrhea and other water-borne diseases.

However, other criteria of success were included in the impact evaluations. The “Hygiene Improvement Framework” established by EHP (Bateman and McGahey) advocates an integrated approach to diarrheal disease reduction linked to hardware installation, hygiene promotion, community organizational skills, and small-revenue enterprises to alleviate poverty and promote the sustainability of urban health improvement. Therefore, the following measures were critical to each project:

- percentage of the population exposed to IEC activities whose awareness of the relationship between safe water and hygiene practices and the prevention of diarrhea increased
- realization of material improvements relevant to each project with the support of the communities
- ability of community-based organizations to manage improved latrine, waste evacuation and water-source facilities

- percentage of the population willing to contribute to improving their sanitation and to pay fee-for-use to services such as public latrines, fountains, and domestic garbage and fecal-sludge evacuation.

3. The ACF Kinshasa Markets Water and Sanitation Project

3.1. Background

With an estimated population of six million people, the city of Kinshasa relies on dozens of open-air public markets of varying sizes. Some have existed for decades in older neighborhoods. Some have sprung up haphazardly in more recently formed *quartiers* of the sprawling capital. The markets' vending stalls, shops and restaurants are not only the primary providers of the population's food, but serve as vibrant economic and social nerve centers of the city. Unfortunately, they are also major public health hazards.

By design, the government is responsible for the operation and management of the city's public markets. However, years of mismanagement and neglect combined with the effects of the current civil strife and a devastated economy have made it impossible for authorities to provide even the most basic services. Hygienic conditions are substandard: wastewater is not drained; garbage piles up chaotically; public latrines, which are rare and outdated, have become sources of fecal contamination; and public drinking-water fountains are extremely rare.

Kinshasa's markets have always been considered state property. Theoretically, there is an established hierarchy to the markets' management. The larger and older markets, such as the Marché Centrale and the Matete Market, fall under the jurisdiction of city hall, while smaller markets established after 1960 fall under the jurisdiction of district authorities. Every market has an administrator, whether appointed by the city governor, as is the case of the official and more established markets, or designated by the market vendors' committee, as is the case of the smaller markets. The vendors pay for both the right to have a stall and to sell their wares. Yet few services are provided to the vendors or their clientele. Principally, because of a lack of financial resources, the national and local administrators responsible for the markets' optimal operating conditions and a healthy environment cannot meet any of those needs. Also, state authorities such as PNA have also been unsuccessful in improving conditions.

3.2. Improvement Plan and Process

Operating under the critical assumption that national and municipal authorities would be consulted and lend support to their assistance, Action Against Hunger devised a plan to initiate community-based improvements in sanitary conditions in the public markets of the capital. ACF maintains a central office in Kinshasa staffed with experts in nutrition, food-security and health education. For this project they would bring in additional personnel, including sanitation officers, to work in coordination with the market population and the REGIDESO. Treating the markets as virtual communities, the ACF project targeted some 30,000 market vendors and their households.

The main goal driving the ACF plan was to reduce public health hazards by improving sanitary conditions and local management in Kinshasa's open-air markets. Implemented in seven of the capital's markets (Gambela, Matete, Selembao, Bayaka, Ngaba, Bandal, Lufungula), the plan's main objectives were:

- build community management capacities and improve hygiene practices
- improve sanitation facilities
- increase the availability of safe drinking water.

3.2.1. Building Community Management Capacities and Improving Hygiene Practices

The first of these objectives—essential to the success of any sustainable community-based project—involved the participation of local authorities and market administrators, as well as the market vendors, primarily women, who would be the principal field agents implementing the project, as well as its primary beneficiaries. They were to have a strong voice in planning the design of the project and assume a role in the health-education program and in monitoring the facilities installed by local contractors and managed by either the market committee, a small enterprise or local CBOs.

After presenting the project to the relevant governmental authorities (the Burgomasters of the seven wards and the Governor of Kinshasa) and signing a protocol with the governor's office, ACF conducted interviews with vendors and clients and organized participatory workshops to identify the main environmental health needs. ACF also attempted to organize water sanitation committees to raise funds to maintain the latrines and water access points being installed and to manage the facilities. Although this activity would be taken over by local entrepreneurs or NGOs, the vendors would continue to support the use of the facilities and contribute significantly to the promotion of healthy behavior practices.

Community ownership of the project, from the propagation of hygiene messages to the maintenance of hygiene-related equipment, was a project priority. ACF created Health Education Teams (HET) at each market to promote environmentally healthful practices. Seven HETs, composed of around 20 people each, drawn mainly from the vendors and restaurant-stand owners, participated in training sessions with hygiene educators and were active in the promotion campaign in their respective market sites. They worked as IEC *animateurs* (motivators), talking to their peer vendors or organizing performances to raise awareness of environmental health issues.

The promotional campaigns included skits, songs and the public broadcasting of messages through the use of megaphones. A theater company designed short plays in the initial portion of the campaign. The messages concerned maintenance of water points, safe water drawing, transport and storage, the proper washing of utensils and hands, the disposal of garbage and the use of the public latrines. In the spirit of the oral tradition of the region, the market women not only created original songs to promote healthy behaviors, but used songs to admonish people guilty of unhealthy practices such as strewing their garbage or incorrectly washing utensils. In addition to public performances, banners, posters and leaflets promoting correct handwashing procedures for vendors and restaurant-stand owners and the correct use of the latrines figured prominently in the campaigns.

3.2.2. Increasing Availability of Safe Drinking Water and Improving Sanitation Facilities

The project's agenda touched on an array of social, environmental and hygiene-related problems in the market itself as well as in domestic practices. These included the maintenance of potable water sources, the use of latrines, and the evacuation of solid waste and soiled waters. The practical results envisioned by ACF—increasing the availability of safe drinking water and the improvement of sanitation facilities—were essential components in reaching any kind of improvement in the environmental health of the target population.

ACF originally proposed to rehabilitate three sanitation units and construct 11 new units, connecting these to the municipal water supply provided by REGIDESO. Nine water tanks of 2 mm³ each and 14 water distribution points, each with three taps, aprons and drainage were to be installed.

Considering their dilapidated condition, restoring existing sanitation units proved not to be cost-effective. Therefore ACF focused on the improved design and construction of new units that would feature shower stalls in addition to latrines and sinks. Nine of the 11 units in the original proposal were built and connected to the REGIDESO network. Because of the low-water pressure available, the elevated 2 mm³ tanks were replaced with two 1 mm³ tanks located near ground level at each of these sites.

Eleven potable water points—consisting of four taps, an apron and a drainage system—were constructed, eight of them equipped with a water reservoir tank. Eleven connections to the municipal water system were made.

At the request of the market women and the ACF/HET organizer, hygiene-related articles (such as soap, towels, brushes, basins and plastic sheeting to cover food) were distributed. This low-cost gesture had a symbolic as well as a material impact, serving as visible signs of change in the hygiene-awareness campaign. In addition, they elevated the expectations of the field-level stakeholders. For example, if a client did not find soap at the facility, (s)he would request it.

By allocating the responsibility of maintaining these sanitation and water supply units directly to the market community or to local entrepreneurs and NGOs under the supervision of the community, the project encouraged small-business ventures. If enough clients were willing to pay the minimal fee for sanitation facility maintenance and provide a modest profit, the implementation would prove sustainable.

Because ACF was continually involved in the field operations, their agents could respond directly to the ongoing needs of the market community, even though some of these were not included in the original proposal, such as:

- repairing a sewage drainage pipe in one market by collaborating with municipal authorities
- constructing or repairing vending stalls so that food could be displayed on platforms, away from the mud and dust of the market grounds
- providing plastic sheets to vendors for protecting the food from insects and dirt.

3.3. Summary of Results

The accomplishments of this short pilot project, even with a minimal budget, were impressive. The reports filed by ACF, USAID/DRC, EHP, and the Kinshasa School of Public Health document the following:

In terms of infrastructure, the ACF project resulted in:

- the construction of nine sanitation units connected to REGIDESO and 18 storage tanks
- the construction of 11 water-distribution points connected to REGIDESO and eight storage tanks
- the management of these units by local organizations in each of the seven markets.

In terms of health awareness and self-improvement within the community, the ACF project facilitated:

- the market populations' focus on hygiene issues in their respective environments and an increased awareness of their ability to organize to correct problems
- the propagation of sound hygiene behavior messages.

Quantitative analysis on improved hygiene practices and childhood-diarrhea reduction was too mixed to draw any valid conclusions. The University of Kinshasa School of Public Health conducted baseline and follow-up surveys in two of the seven pilot markets, Matete and Selembao, to determine what changes had occurred after the ACF intervention. The Matete market neighborhood showed a dramatic reduction in diarrhea prevalence among children under five (from 25% to 12.2 %) and an increase in healthy practices such as proper disposal of garbage, use of latrines, and proper hand and utensil washing and drying. However, the Selembao market households showed an increase in diarrhea among children under five (from 7.7% to 15.1%) and a decrease in the proportion of the population using hygienic practices. These discrepancies are most likely attributable to variables beyond the scope of the intervention rather than to the essential efficacy of the pilot project.

The greatest achievement of the ACF project was the establishment of a collaboration with the market vendors in educating and mobilizing their communities to address their own sanitation needs and as a result, in bringing about visible improvements. Flexibility was a key to the project's success as a community partnership. Because it could adapt to the context in which it was to operate, ACF implementers moved municipal organizations to respond to urgent needs as they arose at the local level, for example, in repairing a pipe spilling sewage.

4. The IRC Kananga Water Supply and Hygiene Education Project

4.1. Background

Located due east of Kinshasa, the city of Kananga is the capital of the Kasai Occidental (Western Kasai) province. This urban center has a population of approximately 800,000 people. Given its central location and its river, road and rail links, Kananga was once slated to be the capital of the country. It is one of the richest provinces in terms of mining and agricultural resources. It is also rich in underground water sources.

Yet, despite the large quantity of water potentially available, less than 15% of Kananga's inhabitants had access to safe potable water before the IRC intervention. While there are many springs flowing through the area, a lack of infrastructure meant that the population did not have access to sufficient clean drinking water supplies with the use of unsafe water leading to elevated rates of diarrheal diseases.

The lack of water, both in quantity and quality, has been one of the main sources of child morbidity and mortality in Kananga. According to the Kananga WHO representative, approximately 17% of children under the age of five die of water-borne diseases. The lack of adequate water for washing and safe potable water for drinking is the major cause of diarrhea afflicting the majority of the children in the area.

According to REGIDESO, the estimated quantity of safe water needed in Kananga is 480,000 mm³ per month. However, they are only able to provide 16,000 mm³ monthly, less than 4% of actual needs. People who do not have access to or who cannot afford REGIDESO services obtain their water from rudimentary catchment systems or from wells and springs that are unprotected and frequently contaminated.

In March 2000, REGIDESO initiated a community-based water distribution and management strategy, installing public fountains providing customers with direct access to clean water for a small fee collected at the source. However, only two such fountains had been installed for the entire town. Indicative of the spirit of private enterprise in DRC, one individual had established a similar system around a groundwater spring on his property. These initiatives, which suggested that clients

would be willing to pay usage fees at the source in exchange for clean water, aided in the development of the IRC improvement plan concept.

4.2. Improvement Plan and Process

Since USAID sought to support urban health improvement activities outside of the capital and since the USAID Office of Transition Initiatives (OTI) already had a visible presence in Kananga, USAID/DRC promoted a community-based water supply and sanitation project that was implemented by the International Rescue Committee.

Conceived as a six-month pilot project initiated in October 2000 and later extended through December 2001, the IRC Kananga Water Supply and Hygiene Education Program defined its overall goal as the reduction of the incidence of morbidity and mortality due to water-borne diseases by increasing local capacity in water provision and management, promoting preventive health measures and increasing access to potable water. Carried out with the collaboration of ADIR (*Association pour le développement intégral en milieu rural*), INADES (*Institut national pour le développement et études sociales*), the Archdiocese of Kananga, the office of the provincial governor, REGIDESO, a local construction firm, and 12 Kananga-based NGOs, the IRC project sought to improve access to safe potable water for 20% of the population (around 150,000 inhabitants), to expose 50% of the population to better hygiene practices and to establish sustainable management systems for any physical improvements.

The project's three initial objectives were to promote better health and hygiene practices, to increase the quantity and improve the quality of household water, and to improve the sustainability of water supply facilities in the town. With the extension of the completion date, two more focused objectives were added: improving the sanitary conditions of the Kananga central market by rebuilding its infrastructure and providing water to the mission/village of Mwamba Mbuyi, 30 miles from Kananga.

4.2.1. Promoting Better Health and Hygiene Practices

After a baseline KAP survey conducted with ESP that served to identify the community needs and their perception of hygiene-related issues, IRC initiated a hygiene education and training campaign working with the targeted communities. Aided by Kananga-based specialists in health education, the campaign included the distribution of printed materials in schools, community centers, churches and health clinics. Health and hygiene training sessions reached more than 7,000 participants. Radio and television stations broadcast messages concerning water supply and sanitation measures such as proper approaches to transporting and protecting household water supply, hand washing, and evacuation of garbage and human waste.

The major aim of this IEC campaign was to establish linkages between safe water and proper hygiene and diarrhea prevention. An estimated 50% of the area's households were exposed to messages regarding these health practices.

4.2.2. Increasing the Quantity and Improving the Quality of Household Water Available

The IRC's initial six-month plan envisioned the construction and/or protection of 60 natural sources, principally springs, and four water tanks, each with a holding capacity of 150 mm³ of water, and four public fountains to be connected to the existing REGIDESO network.

The major aim of this project was to provide safe-water sources within an easy walking distance of households on a fee-for-use basis.

With the technical assistance of ADIR, the local CBOs were to assume responsibility for building the water-supply sources with the help of manual labor from the mobilized community and a local contractor. This activity would provide more than one million liters of potable water per day. The Archdiocese of Kananga assisted the reservoir and fountain building in four neighborhoods, including a public market mentioned below (see Section 4.2.4.), to reach an estimated 150,000 people.

During the course of the implementation period, four reservoir/fountains and 75 individual safe water-supply sources were completed. Their maintenance and management would be undertaken by CBOs, NGOs and local micro-enterprises.

4.2.3. Improving the Sustainability of Water Supply Facilities

Every aspect of the project was implemented by local organizations. The CBO partners—including two women's groups, *Ba Mamu Tabulukayi* and *Département Femme et Famille*—received training in collaborating with their communities to assess water needs and construct spring caps, in furthering IEC campaigns, and in managing cost recovery water-delivery systems. In turn, they trained 76 water committees in the proper financial management and maintenance of the water sources.

By strengthening the local organizations' technical and management skills, the IRC plan sought to ensure the sustainability of the operations. Assuming that the direct collection of minimal fees at water sources and community cooperative building, maintenance and management could furnish sufficient revenue and personnel to sustain the installed water supply facilities, IRC trained some 50 members of the local NGOs to implement the project.

Although the IRC project could demonstrate that the creation of small business management and community control over the water supply was feasible, it could

not—as a short-term pilot project—ensure long-term sustainability. The ESP impact evaluation report noted that the lack of management experience on the part of the local NGOs, the extreme poverty of the population, and the modest fees demanded to use the facilities (much lower than those required by REGIDESO) ultimately would impede the sustainability of the water supply project. Consequently, USAID/DRC committed extra resources after the completion of the pilot project to boost the capacity of each management organization.

4.2.4. Improving the Sanitary Conditions of the Kananga Central Market by Rebuilding Infrastructure and Providing Water to the Mission/Village of Mwamba Mbuyi

Added as part of the project's extension, these objectives sought immediate concrete results by focusing on providing necessary infrastructure. In the Kananga central market, IRC facilitated the rebuilding of a butcher shop, the reconstruction of four warehouses, the rehabilitation of eight public latrines and the installation of one cistern. The Mwamba Mbuyi mission/village (population 3,500) improvement project included the recapping of an existing spring equipped with a sand and gravel filter, the construction of a storage tank and the installation of a pump-driven water distribution system.

4.3. Summary of Results

The IRC Kananga project met its primary objectives as a one-year urban environmental health pilot project.

In terms of infrastructure, the project resulted in:

- the construction and/or protection of 76 accessible clean-water supply sources
- the construction of four water tanks (three of 150 mm³ capacity and one of 125 mm³ capacity) and four public fountains connected to the REGIDESO network
- an additional water rechanneling and a water storage tank in a neighboring town
- the improvement of other infrastructure in the Kananga central market

The project activities have provided safe potable water to over 30,000 people a day. The improvement of sanitary conditions in the central Kananga market should benefit everyone using the market, including people from surrounding villages.

From the perspective of self-management and health awareness within the community, the IRC Kananga project facilitated:

- the strengthening of local CBOs' technical and management skills
- the propagation of sound hygiene behavior messages.

The final ESP survey revealed an increased exposure to hygiene lessons and awareness of healthy practices. However, the quantitative analysis could not demonstrate either a significant change in habits or a reduction in childhood diarrhea for two reasons. First, one year is too short a time to register significant differences. And second, two differing methods of collecting data were applied in the initial more extensive KAP survey and in the final rapid-assessment techniques, both of which did not cover the same population.

The ESP report also indicates initial resistance to the project—in part, as a result of unrealistic expectations, such as building a dam or providing tap water in homes and, in part, because of the confusion in the management of water sources and fee collection. Both were overcome as the population became more aware of the project's scope. Group discussions also revealed that the majority of heads of households at first resisted paying for “natural” water sources they thought should be free. Understanding the need to pay for the protection of springs increased with the education campaign. The vast majority of inhabitants in the targeted area wished the project to continue and expected further improvement from the plan. Most indicated an awareness of the benefits provided by the new water supply and a willingness to pay for the services provided.

The project's greatest achievements were to be found in increasing the number of protected potable water sources within walking distance of homes and in initiating micro-enterprises to maintain these sources.

5. The IRC Barumbu Environmental Health Pilot Project

5.1. Background

Developed on the east bank of the Congo River, the city of Kinshasa is divided into 24 *communes* (wards), which are further subdivided into *quartiers* (precincts). The University of Kinshasa School of Public Health has singled out a number of communes where diarrheal diseases are most prevalent and pose the greatest public health risk. Barumbu is among these. Because the Barumbu commune is situated in the lowlands bordering the river, it is frequently subject to flooding and subsequent pollution. In other words, Barumbu must contend not only with its own problems of waste evacuation and clean water supply, but with the debris and problems arriving from other communes upriver.

Barumbu has long been aware of these problems, and community groups have made strides to engage the population in correcting these conditions. Created in 1996, the *Cellule de Base pour l'Assainissement de Barumbu* (CEBAB)—composed of representatives from churches, businesses, women's interest groups and local NGOs—has spearheaded efforts to address flooding problems. With “Food for Work” funds from the *Fédération laïque à vocation économique* (FOLECO, a German-government supported local NGO), the burgomaster's office in Barumbu commune and a local parish, CEBAB has implemented community-awareness and building projects to help rid the river and canals of contaminating and clogging waste.

5.2. Improvement Plan and Process

The IRC's 15-month environmental health pilot project sought to tap into the community's existing capacity for self-organization while continuing to collaborate with CEBAB and local governmental and clerical organizations in sensitizing and mobilizing the population. IRC focused its activities primarily in two neighborhoods located along the Belgika river basin where the problems of drainage, waste accumulation and flooding are acute, and awareness is high. The program would directly reach an estimated 5,000 households.

The community would be involved at all stages, from the baseline KAP survey of needs and awareness through the implementation and the final survey. IRC would bring to the effort management skills and implementation support, including innovative technology to address critical needs. This included sponsoring push carts to evacuate garbage and sponsoring a consultancy from WASTE—a non-profit agency based in the Netherlands that specializes in community-based environmental improvement projects—to evaluate the use of a MAPET (Manual Pit Latrine Emptying Technology), a hand-operated pump used to evacuate fecal sludge. WASTE would also provide CEBAB with additional financial management and marketing skills.

The overall goal of the IRC intervention was twofold: to reduce the incidence of diarrheal diseases by working with the community to eliminate various vectors found in the environment and to identify and test creative solutions and alternative techniques for addressing urban environmental health and sanitation problems.

The project's activities were designed around four objectives:

- building the capacity of the community to identify and address its own sanitation needs
- improving wastewater management and drainage
- increasing sanitation facility use
- improving domestic and community hygiene practices.

5.2.1. Building Community Capacity to Identify and Address Its Own Sanitation Needs

Before the ESP baseline survey of households, trained educators/facilitators from the community conducted focus group sessions with youths, parents, neighborhood leaders (*chefs de quartier* and *comité populaire* members) and members of CEBAB to determine their perceptions of Barumbu's sanitation problems and remedial actions needed and to define tasks. Issues that emerged from these discussions centered on the disposal of waste and sewage, the cleaning of canals and the need to sell market food so that it is protected by being off the ground and covered.

The survey involved some 700 households, 17 schools, 17 health centers and eight churches. As a core stakeholder, CEBAB was influential in recruiting community *sensibiliseurs* ("sensitizers" or peer educators) trained in hygiene basics to work in focus groups and in individual households. Results of the discussion groups and the survey were disseminated in public assemblies. Thirty-three percent of the households in the target area reported having participated in a neighborhood effort to improve sanitation. Eight new neighborhood sanitation committees were

subsequently created to work on cleaning the canals, and 15 churches were committed to assisting sanitation improvements.

Community capacity-building and ownership were the initial priorities of the project. IRC provided technical assistance in these areas and facilitated the changes described below.

5.2.2. Improving Waste Water Management and Drainage

Working with CEBAB and the burgomaster's office, IRC enlisted the local population in improving the drainage system to evacuate soiled waters and remove or recycle solid waste. By the end of the project, 536 households were cleaning the tertiary canals around their compounds and water was flowing freely around more than half the dwellings.

IRC financed the purchase of nine push carts (*pousse-pousses*) to remove solid waste from households for a minimal fee. Donated to CEBAB, these carts would be operated by local garbage collectors who established regular routes collecting domestic waste for a fee, thus providing the creation of a small business within the community and reducing blockage of waste-water drains. By the end of the project, 265 households had subscribed to regular garbage service collection.

Composting and recycling appropriate organic waste was to be carried out by CEBAB agents to encourage the removal of solid waste from drainage canals in order to reduce flooding in Barumbu. However, the pilot project was too limited in scope and time to ensure the establishment of a composting and recycling market.

5.2.3. Increasing Sanitation Facility Use

IRC used two strategies to increase sanitation facility use. The most innovative of the two was the introduction of the MAPET manual pump combined with building a wetland (completed in January 2002) to facilitate the evacuation of household latrines and septic tanks. This technology was introduced in response to initial assessment activities that cited over-loaded tanks as the reason people were not using toilets. The pump was loaned to CEBAB and operated on a fee-for-use basis. By the end of the project, 13 households were employing the service, and 30 were on a waiting list to do so. If a market could be established, it would stimulate local fabrication of such pumps in the future.

The second strategy was the construction of public toilet facilities. Four latrines were built in the Barumbu public market of Epolo. A faucet and handwashing area provided with soap was located next to the latrines. CEBAB would maintain and manage these facilities, which were operated on a fee-for-use basis, thus generating approximately US\$ 35 a month to cover operational costs.

5.2.4. Improving Domestic and Community Hygiene Practices

A major priority of the Barumbu project was to work with local communities in building their capacity to improve hygiene. The educators or “sensibiliseurs” who conducted the public health education campaign and survey interviews were drawn from the target population. ESP trained ten educators in IEC techniques, needs assessment and strategy development.

Awareness of sanitation problems and sound hygiene lessons were developed through the following media:

- radio and television broadcasts on the national network
- motorized caravans and carnivals including the creation of giant masks
- formal performances and street theater
- discussion groups, general assemblies and public fêtes
- home visits by community educators.

According to both the ESP and the IRC final reports, live performances were more effective than mass media in reaching people. The majority of focus group participants cited theater as the single IEC technique that best relayed messages. The other medium cited as having strong impact was the home visit by the community educators.

5.3. Summary of Results

As a pilot program, the IRC Barumbu project demonstrates what can be done in a short time by working with and strengthening community partners.

From an infrastructure perspective, the project succeeded in introducing the MAPET pump combined with wetlands to empty domestic latrines, in building public latrines in the Epolo market, in financing the purchase of push carts to evacuate solid waste and in increasing the efficiency of the existing drainage network. All these initiatives are sustainable and should generate income for local providers.

In terms of hygiene education, the project succeeded in training multiple community educators to sensitize the population and in propagating messages through print material, through live performances and public gatherings, and, to some extent, through radio and television.

ESP conducted a limited final survey in random streets and neighborhoods of Barumbu, both in the targeted zone and elsewhere. Their analysis shows an increased

awareness and shift in hygiene behaviors in the project area. Forty-six percent of the population surveyed in the post-intervention study linked diarrhea to sanitation, compared to 6.8% in the initial study. The percentage of households surveyed using clean containers for water storage increased from 49.2% to 80.3% and the percentage of households surveyed covering pit latrines from 7.3% to 16%. The percentage of households using garbage cans and paying push carts to remove garbage also increased noticeably.

Results on the reduction of childhood diarrhea were inconclusive. A majority of interlocutors from focus groups and interviews claimed that fewer children had been afflicted with diarrhea since the intervention had begun. The ESP mid-term impact evaluation supported this. However, the final survey does not indicate a significant quantitative reduction. Again, too many variables in the environment, including the survey methods and the limited nature of the intervention—in both time and scope—affected this finding.

The most significant accomplishment of the Barumbu project is the active participation of the community in the sanitation activities, its willingness to pay for the garbage collection services and MAPET emptying of pit latrines, and its clear wish to continue these activities. A good measure of the success of the pilot project is that neighborhoods outside the targeted area complained they did not benefit directly from CEBAB and IRC improvements. They wished the project had been extended to the whole commune of Barumbu.

6. Achievements and Lessons Learned

6.1. Summary of Pilot Project Achievements

All three urban environmental health pilot projects accomplished the bulk of the activities set out in their proposals for meeting their objectives. With relatively small budgets and a short time frame, IRC, ACF with their DRC field partners succeeded in initiating material changes in water supply, waste management, and hygiene facilities and hardware.

Although the length of the interventions was too brief to prove significant health behavior changes or reductions of childhood diarrhea, the projects clearly succeeded in hygiene promotion through multiple media, especially through live interactions within the community. By mobilizing the target populations to express and address their own needs, to seek out self-directed solutions to sanitation problems, and by stimulating local micro-enterprise management of the water sources, waste evacuation and sanitation facilities installed, these interventions demonstrate the potential of sustainable, community-based development projects.

As reported in the final IRC and ACF reports and in the ESP impact surveys, the majority of the population involved in the three pilot projects stated that they had actively contributed to the projects, that through IEC activities they had increased their awareness of the benefits of urban environmental health efforts and the link between safe water, hygiene and diarrhea prevention, that they were willing to pay for improved water and evacuation services, and that they wished for the projects to continue and expand.

The following table summarizes the three pilot projects' performance in relation to the eight components set out in the USAID/DRC Urban Environmental Health Strategy (see Section 2.1.).

Performance of Pilot Projects in Relation to the Components of the Urban Environmental Health Strategy

Strategy Component	Pilot Project					
	IRC Barumbu		IRC Kananga		ACF Markets	
	<u>yes</u>	<u>no</u>	<u>yes</u>	<u>no</u>	<u>yes</u>	<u>no</u>
Community participation	X		X		X	
Behavior change	X		X		X	
Targeted priorities	X		X		X	
Decentralization of service delivery	X		X		X	
Microenterprises for sanitation	X		X		X	
Cooperation with health facilities		X	X			X
IEC and training	X		X		X	
Alternative techniques	X			X		X

This table indicates strong community participation and propagation of hygiene lessons, focused priorities, decentralization of service delivery and the creation of micro-enterprises. The use of alternative techniques proved practical only in the Barumbu case (MAPET/wetlands combination). Outside the Kananga project, cooperation with existing health facilities was weak. However desirable, this type of institutional environmental-health cooperation can only be established in a longer-term project.

Ultimately, the Kinshasa Markets, the Kananga, and the Barumbu efforts all proved highly successful as community mobilizing, infrastructure improvement and self-management projects. Their success as public health endeavors appeared significant when viewed through the qualitative research results, but could not be quantitatively proven because of the limits of both the surveys and the projects themselves, the short time spans and the limited scope of the interventions in relation to the multitude of environmental health problems. However, preliminary results indicate that if these pilots were funded as long term projects, the public health benefits would appear more clearly both in quantitative and qualitative analyses.

6.2. Lessons Learned

6.2.1. Program Design and Flexibility

Lesson 1: Proposals must be written based upon a thorough understanding of the situation in the field.

A prime example of this is the IRC Kananga project, which built upon and benefited from a long-standing presence of the USAID-supported Office of Transition Initiatives (OTI) in the city. The presence of this group, which had been engaged in

the community for a substantial time and had facilitated coordinated planning with stakeholders, enabled rapid start-up, smooth implementation and performance that exceeded project indicators.

On the other hand, at the early stages of the Barumbu project, IRC was surprised to uncover the poor management and implementation capacity of their field partner, CEBAB, and this led to the need for increased efforts in managing the results of the completed activities. In the Kinshasa Markets project, ACF also experienced difficulties because they underestimated the input required to implement activities in multiple locations involving multiple administrations and communities.

The initial establishment of working relationships with both the stakeholders in the field and local governing authorities is essential to the success of the project. Adequate time for building these relationships and for refining proposals should be built into the design of these projects and be appropriately funded, particularly if the implementing NGOs are new to the location.

Lesson 2: A formal start-up workshop bringing together implementers and primary stakeholders is beneficial in project implementation.

The IRC/Kinshasa team—with representatives from CEBAB and the Barumbu burgomaster's office—the IRC/Kananga team, the ACF project team, USAID/DRC officers, a representative from REGIDESO, and the ESP agents who would conduct the pre-testing and impact evaluation surveys of the three pilot projects all attended a three-day start-up workshop organized by EHP and facilitated by the representative of the health office of the Kinshasa Archdiocese (see Section 2.3.). Each of the three implementing teams referred to the importance of the workshop and recommended that such workshops be included in any future projects. The workshop increased their focus on the overall objectives, served as a forum to present and discuss information of general interest to all stakeholders and implementers, and resulted in a coherent understanding of their role in the urban environmental health project.

Lesson 3: The program plan must be well-structured but allow flexibility for improvements not stipulated in the original design. The implementers should be able to make subsequent budgeting reallocations with the approval of their immediate supervisors.

Both IRC and ACF implementers proved adaptable to field conditions and accepted changes in direction or focus, making their projects responsive to the immediate needs of the community. The Kinshasa Markets project—which brought about the construction of elevated platforms for vendors and the replacement of a broken sewage pipe with the cooperation of municipal authorities—is a prime example of such “demand-responsive” partnerships.

Often, however, initiatives of this sort that may require the reallocation of funds, must go through a bureaucratic process that impedes rather than expedites operational improvements out in the field. The offices that approve any changes must be

cognizant of that reality. Therefore, the local USAID bureau should be given the authority to agree to minor shifts in project design and budget reallocation as appropriate.

Adaptability to field conditions and flexibility in program implementation often can be the key to the ultimate success of a community-based project. Donors, planners and implementers should keep this important lesson in mind.

6.2.2. IEC and Hygiene Behavior Change

Lesson 1: Training and equipping of community motivators/peer educators are crucial to the accomplishment of hygiene behavior change.

In both domestic and market settings, committed motivators from the community, working with community members in the languages of the targeted population (in these cases, French, Lingala and Chiluba), are essential in engaging wide audiences and influencing individual and household behaviors. Live performances and person-to-person contacts proved more effective than mass media messages in bringing about change. Each pilot project trained the motivators in pertinent environmental health issues in partnership with ESP and equipped them with educational materials and the supplies they needed to carry out their duties.

The training enabled the motivators to take on a broader community-development role than envisioned by IRC or ACF and it left behind a better educated and skilled cadre of people to assist with additional health improvements.

Lesson 2: Comprehensive baseline surveys focused on targeted behaviors are important for both planning IEC and training as well as for documenting health impacts.

The IRC and ACF teams made extensive use of the results of the KAP baseline surveys in identifying the high-risk behaviors targeted in community-level IEC campaigns. Messages were developed based on the survey results, and community animators worked with ESP and the project's staff to develop IEC materials to facilitate change.

Lesson 3: All community members can be mobilized as motivators and educators.

ACF proved particularly successful in training market vendors not only to be concerned with their own hygiene and that of their establishment, but also to teach fellow vendors and their customers good hygiene practices such as proper hand washing, covering of food, appropriate cooking locations, and proper cleaning and drying of utensils.

The more agents from the community involved in the self-improvement plan, the more likely is community ownership of that plan.

Lesson 4: Multiple means of communication should be used in implementing behavior change activities.

Multiple means of communication are important not only in broadcasting hygiene lessons, but also in informing the population regarding the existence and the intentions of the project. Building trust in the implementing organizations and in the benefits of the project are vital.

The IRC and ACF projects used a range of communication channels to conduct IEC activities: flyers and picture books, songs, theater, megaphone and mass-media broadcasting of messages, group discussions and person-to-person dialogues. The ACF Kinshasa Markets report indicates that live performance by trained IEC market agents and megaphone messages were particularly influential in bringing home hygiene lessons. The IRC/Kananga report highlights mass media as influential. The IRC/Barumbu report indicates that live theater had much more impact than more costly mass-media broadcasts.

All reports indicate that person-to-person contacts with community agents was probably most important in mobilizing the population, in sensitizing them to the objectives of the projects and in bringing about significant behavior change. After all, it seems clear that one is much more likely to listen to and dialogue with one's neighbor than to be directly affected by mass media. Dialogues can instigate meaningful change because they are personalized and direct, while mass media tend to propagate anonymous messages.

While live performances and person-to-person contacts have the strongest impacts, print materials widely distributed and mass-media messages still do serve to increase sensitivity and provide information. Since they are mutually supportive, no media should be neglected in education and behavior change campaigns.

6.2.3. Strengthening Local Partners and Community Ownership

Lesson 1: Sufficient time must be set aside at the beginning of implementation to understand and train local partners, including government and community-based organizations.

The implementing teams found that a minimum of three to four months was necessary to fully engage their local community partners, integrate them into field activities and strengthen their ability to work with their constituents. In addition to community-based organizations, the support of national, municipal and local (state, commune and quartier) authorities needs to be established as early in the implementation process as possible. Ideally, this should happen in advance of proposal preparation, as it did to some extent in the Kananga and Barumbu projects.

Lesson 2: Comprehensive market sanitation projects should be viewed and implemented following the same steps as comprehensive community development projects.

In order to achieve their success, ACF had to consider market administrators, vendors and restaurant-stand operators as virtual community members and engage them in community-based planning and action. IRC had to do this as well in the Barumbu Epolo market and in the Kananga central market. This approach—community-process implementation—is a relatively low-cost and effective way to engage stakeholders and improve market conditions with sustainability.

Lesson 3: Local partnership activities should not be confined to a single partner. Establishing community ownership is critical to success.

IRC learned this lesson particularly well in Barumbu. From the beginning of the project, it was committed to working with CEBAB. However, this early commitment reduced IRC's ability to work with a range of local partners to implement the wide range of activities in which they became engaged and to extend their influence. The establishment of eight neighborhood sanitation efforts contributed to extending the project beyond CEBAB agents, an approach that proved both practical and politically sound.

As in the case of IEC development mentioned above (see Section 6.2.2.), the more community partners included in the project, the more likely that the result will be community ownership.

It is also crucial to recognize that in a context such as urban DRC areas, community participation does not automatically equal community ownership. The population has a history of providing manual labor for projects that they do not own—dating back to colonial times of forced labor through the *salongo* enterprises of the Mobutu era. Accustomed to the re-appropriation of their efforts, the population needs to be assured that they indeed are seen as partners and not merely subjects of the project. Involving a maximum of CBOs is the best way to achieve this.

6.2.4. Financial Sustainability of Interventions

Lesson 1: One year is too short a time period to accomplish a pilot intervention and ensure its long-term sustainability.

Each pilot project has achieved notable success in establishing income-generating activities such as water sales, latrine operation, solid waste collection and composting. However, one cannot expect a short-term intervention to ensure the long-term viability of the micro-enterprises initiated. The principal focus of the Kinshasa Markets as well as the Kananga, and the Barumbu projects was to test field interventions and develop lessons for their continuation and for future projects.

Despite insufficient time for field development of community-based organizations to solidify their capacity to manage activities over the medium and long terms, the pilot projects have adequately demonstrated their potential for sustainability.

Lesson 2: Income can be generated by community-based water and waste management organizations.

As the following table drawn from the data on the Kinshasa Markets program shows, income can be generated to sustain small-scale, community-based waste management when the community is willing to pay for these on a fee-per-usage basis.

Net Income for Initial Two Weeks of Public Latrine Gambela Market (ACF Report)

Week	Total Receipts	Personnel Transport Cost	Operation/ Maintenance	Net Income
July 12–17, 2001	FC 150,425 US\$ 501	FC 52,510 US\$ 175	FC 8,700 US\$ 29	FC 89,215 US\$ 297
July 18–23, 2001	FC 150,280 US\$ 501	FC 52,460 US\$ 175	FC 46,320 US\$ 154	FC 51,500 US\$ 172
Average	FC 150,352 US\$ 501	FC 52,485 US\$ 175	FC 27,510 US\$ 92	FC 70,357 US\$ 234

FC—Congolese Francs

US\$—United States Dollars

Fee charged for latrine use—FC 20 (around 7 US cents) per visit

Significant income can be generated from the management of public sanitation units (latrines and cleaning facilities) in market areas. Two hundred dollars per week (US) is a very high income stream for a small business in the DRC, even as this amount should be monitored to confirm its sustainability. To motivate quality performance, the income of the operators should be linked to the overall income of the facilities, rather than by providing a set salary. This linkage encourages the operator to generate customers and ensure the collection of fees.

Numerous examples of small-business management within the community exist in the three pilot projects. As the Barumbu project demonstrates, solid waste can be collected and safely disposed of while, at the same time, generating income for individual collectors (*pousse-pousseurs*) and for community-based organizations that mobilize multiple collectors. The IRC Kananga project also has demonstrated that income can be generated by small-scale water vending from the improved water-supply sources.

Lesson 3: In income generating projects related to infrastructure management, a targeted amount of funds should be mandated and set aside to cover recurring capital costs.

The market latrines developed by ACF are placed under the control of local NGOs or private sector partners based on written and signed protocols. As written, however, the protocols do not address the issue of retaining funds for long-term capital costs

including, but not limited to, the emptying of latrine storage tanks and the repair of materials and fixtures. Future protocols should require that a certain amount of regular income be placed in a bank account specifically to cover these anticipated and unanticipated costs.

Lesson 4: In micro-enterprise building, strong efforts should be made to ensure that collected fees retain their value over time.

The political and economic conditions in Congo are volatile. Severe currency devaluations have occurred during the implementation of the pilot projects. Every effort should be made in income generating activities to enable local partners to establish bank accounts in currencies that are less likely to fluctuate than the Congolese Franc. A successful example of this in Kinshasa is FOLECO, a local umbrella organization that establishes US dollar-denominated accounts for local NGOs for a nominal initial fee.

6.2.5. Survey Evaluations and Follow-up

Lesson 1: The incorporation of a local institution such as ESP can serve the implementation as well as the evaluation of a community-based project.

As pointed out earlier (see Section 6.2.2.), baseline surveys can provide important information for IEC efforts and train local participants in survey methods. ESP agents contributed to the implementation of the three projects by participating in initial focus group discussions and by training CBO agents in IEC endeavors. These increased the concept of community ownership, a notion vital to the ultimate success of the pilot projects.

However, principally because of budgetary restrictions, ESP could not ensure the scientific validity of the impact evaluation EHP hoped to produce.

Lesson 2: Indicators and feasibility must be realistic. Methods of data gathering must be consistent.

Although the goal of diarrhea reduction among children under the age of five served to focus the projects toward reducing harmful vectors and increasing the population's awareness of the link between diarrhea and poor water and sanitation, it is not realistic to assume this goal could be quantitatively proven within the short time span of the pilot projects.

The ESP qualitative evaluations consistently show a rise in the population's awareness of the link between hygiene and diarrhea, but cannot show a definitive reduction in childhood diarrhea. This is the result of other variables in the environment as well as a time span much too short to realistically expect evidence of this kind of change. Discrepancies in the quantitative results also seem the result of disparate survey methodologies. For example, an extensive KAP survey initiated the

Kananga project and continued through a mid-term assessment, yet ESP could only afford a rapid assessment for the final evaluation impact survey.

This disparity in no way reflects on the competency of ESP, an institution that should be encouraged to provide support and validity to other DRC local projects. It does, however, imply that the funds allotted to evaluating the projects must be adequate and the expectations realistic.

Lesson 3: Follow-up on initiated activities is essential to their long-term sustainability.

The three pilot urban environmental health projects conducted in the DRC demonstrate that significant change can occur within a limited scope and time span, but that their sustainability depends on continuation of the project and/or coordination with other projects. Because of the climate of mistrust that reigns between competing actors in the DRC and because of the fragile management structures of the CBOs and small enterprises there, in order to help ensure the continuation of the sanitation projects IRC and ACF had to provide support beyond their budgeted requirements. USAID/DRC also provided support to the fledgling operations.

Although the Kinshasa Markets, the Kananga and the Barumbu projects succeeded in their immediate goals and have established clear lessons for future activities, they risk leaving behind insufficiently strong partners to sustain these achievements. Community participants, the NGO implementing teams, and the USAID/DRC Kinshasa office all expressed the need for follow-up support of the activities and structures that have been put in place thus far.

Adequate follow-up on pilot projects is essential for their survival, to maintain the good will established toward USAID and for the success of further development projects in the DRC.

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Annex 1:

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Annex 2:

Evaluation Methodologies and Tabulated Findings

IRC Kananga Water Supply and Sanitation Project

1. Type of Study

The impact study was essentially a KAP study conducted after the IRC activity. This second observation coupled with the first and a rapid mid-term evaluation constitute a collection of quasi-experimental works (pre-test, post-test studies).

2. Data Collection

Focus groups: Ten focus groups were organized in the area of health, related specifically to the management of water points. The leaders use these groups to gather qualitative information. The groups included adolescents (young boys and girls), adult men, members of the NGO managing the water point and health sector officials. The focus groups were organized to gather information and to elicit from people their attitudes, perceptions and problems related to the activity led by IRC.

Household interviews: This study also included a rapid evaluation in a limited number of households chosen at random across the city of Kananga. The city is comprised of four health zones. Each health zone is then subdivided into health areas. It was decided to work in ten health areas, and these were chosen randomly. Thirty households were chosen at random in a systematic fashion in each health area.

Document review: The data concerning the cases of diarrhea registered at the health facilities were collected for the six months preceding the study. In order to do this, eight health facilities (four per health zone) were chosen using two criteria: the frequency of the disease in the population and the appreciation of the political leadership for primary health.

3. Treatment and Analysis of Data

The qualitative data were analyzed and the essential information synthesized from each group. The data resulting from the household surveys were treated and analyzed by the collector using EPI Info 6.04.

The results were analyzed to permit the calculation of indicators tabulated below:

No	Indicator	First Study (Nov. 2000)	Second Study (Nov. 2001)
1	Percentage of households disposing of excreta in a latrine	89.1 %	93.9 %
2	Percentage of households knowing the correct technique for hygienically washing hands	34.3 %	40.2 %
3	Percentage of households correctly performing the technique for hygienically washing hands	40.9 %	35.1%
4	Percentage of children under the age of 5 who have had diarrhea in the last two weeks	8.3 %	26.8 %

Participation of household member in sensitization meetings

Participation	Number	Percentage
Yes	89	35.9
No	159	64.1

Understanding of diarrhea in the household

Mode of transmission of diarrhea	Number	Percentage
Non-covered/badly prepared food	127	43.5
Bad quality water	80	27.4
Pests	70	24.0
Lack of hygiene	40	13.7
Excessive eating of salty food	22	7.5
Mice	14	4.8
Don't know	13	4.5
Other	5	1.7

IRC Barumbu Project

1. Type of Study

The study was designed as a field experimental, socio-environmental study. During the pre-intervention survey, specific information related to water, waste disposal, sanitation and domestic hygiene in selected households and public institutions were collected both from the intervention area and the non-intervention area in Barumbu commune. The latter served as a control group. The survey was followed by the interventions. The overall study was a non-randomized pretest-post test control group design without random assignment of

quarters to any group. The intervention quarter's group was selected by IRC based on their proper criteria. At the end of the IRC interventions, similar surveys were conducted to assess impacts that could be linked to the IRC intervention.

2. Sample Size

Barumbu has about 74,000 inhabitants and 3,453 households. The sample size was calculated according to B. Rosner (1996) assuming that 53% of the population had access to adequate sanitation. The calculated sample was rounded up to 500, bringing the whole size to 1,000, to take into account the non-intervention area. The sample from each quarter was proportional to the number of households. Sample size for public institutions was estimated from the total available number of institutions, and one-third of public institutions were considered for churches and hotels/bars, schools, while for markets, all were included. For focus groups, the number of participants for each group varied between eight and ten, as required.

3. Sampling procedure

In each quarter, households were selected randomly using a calculated step of four. After selecting the direction with a pencil point, the households were selected systematically starting from the house of the “chef du quartier.” The first unit selected corresponded to a randomly selected number between one and four; the next unit corresponded to that number plus two steps, etc. In each household, the head of the household was identified and interviewed. If the unit had more than one household, then the one interviewed was selected randomly.

4. Data Collection and Analysis

Training: Twenty participants attended a training session on basic concepts of individual and collective hygiene, sampling procedures, interview techniques and questionnaire administration.

Data Collection: Data were collected by trained surveyors using a pre-tested questionnaire. Face-to-face interviews were done with 961 household heads across Barumbu. Some of the questions were asked to child caregivers and food preparers. The plan was to do observations and interviews in 13 schools, 13 health centers, 21 bars, 30 churches, and eight markets with a focus on their environmental conditions, but some of those institutions did not agree to participate.

Data dealing with community attitude/perception about hygiene and sanitation were collected through focus groups and questionnaires. Nine focus groups were organized targeting women, young adults (ages 18–25), local NGO members, the “chefs de quartiers,” CPP members, commune hygiene technicians and vendors. For each group, a specific discussion guideline was developed.

Geo-referenced data for public institutions were also collected using a Global Positioning System. This information was associated with health data for selected diseases to produce sets of maps.

5. Data Analysis

Qualitative data collected during the focus groups was analyzed before starting the survey. Some of the results were incorporated into the questionnaire. Data from the survey was processed and treated using EPI Info 6.04 and SPSS 10.0 software.

Descriptive statistics such as the central tendency dispersion measures were calculated. Also, data were used to generate specific indicators and summarized in tables and figures. Cross tables were generated to apply inferential statistic tests such as chi-square, while frequencies and descriptive statistics of selected parameters were used to generate specific indicators.

No	Indicator	1st Study (Nov. 2000)	2nd Study (June 2001)	3rd Study (Dec. 2002)
1	Water			
	Percentage of households with a clean water storage container	49.2	ND	80.3
2	Sanitation			
2.1	Percentage of household using a latrine	96.7	97.5	80.3
2.2	Percentage of latrines which are usually covered	7.3	19.7	16.0
2.3	Percentage of households with a container for disposing of household solid waste	73.4	78.5	82.8
3	Hygiene			
3.1	Percentage of households with knowledge of the correct technique for washing hands	64.4	56.2	20.3
3.2	Percentage of households which correctly perform the proper technique for washing hands	60.1	58.3	52.5
4	Morbidity and Mortality			
4.1	Percentage of children under the age of 5 who had diarrhea in the last two weeks	9.4	10.4	19.0

ACF Market Project

1. Type of Study

The study was designed as a socio-epidemiological transverse study of the users of markets including vendors, clients, restaurateurs and households of vendors.

2. Study Site

The study was conducted in the markets where ACF is intervening, specifically the markets of Selembao and Matete.

3. Target population

The users of the market were selected for the study. The households of the vendors in a distance of five streets around the market were also part of the study. This was done to see if the experience in the market was transferred to the homes of the vendors and to gather information on diarrhea at the homes of children under the age of five.

4. Sampling

Selection of the vendors: For each market studied, the vendors were visited at their workplace and potentially received a visit at their home if they lived within five streets of the market. Actual visits were made to households chosen randomly from a list of all possible households.

Selection of restaurateurs: All of the restaurants operating in the area of the two markets were included in the study.

Regular clients: For each restaurant, three regular clients were identified and interviewed.

5. Data Collection

With the help of a pre-tested questionnaire, information was collected by experienced interviewers. Other information was obtained in discussions on the attitudes and perceptions of market users regarding the problems of hygiene and sanitation in the markets as well as about the interventions carried out by ACF.

With respect to the households of vendors, complementary observations were conducted on hygienic conditions in the household as well as the status of health of children under the age of five.

6. Treatment and Analysis of Data

The data collected was treated and analyzed using EPI Info 6.04 and SPSS version 10.0 for Windows. The data were used to generate reports on the selected indicators as tabulated below.

Indicator	Matete Market		Selembao Market	
	Before	After	Before	After
Percentage of restaurateurs who wash their hands after going to the toilet	51.7	64.9	64.7	81.0
Percentage of restaurateurs who participated at least once in an education session	ND	82.6	ND	45.5
Percentage of restaurateurs correctly washing their hands	30.0	44.4	48.1	56.4
Percentage of restaurateurs throwing their garbage into the street	13.3	0.0	9.4	12.0
Average distance between garbage and a restaurant	1.86m	4.57m	3.47m	3.52m
Percentage of market clients who know the steps for properly washing hands	1.8	15.0	12.8	7.9
Percentage of vendors who correctly wash their hands	38.4	47.6	61.1	52.6
Percentage of vendors displaying their goods on the ground	3.7	1.2	3.7	2.4
Percentage of vendors defecating under the table	1.5	1.5	0	1.9
Number of children under the age of 5 who died	4	2	2	6
Number of children under the age of 5 who died from diarrhea	0	0	1	6
Number of cases of diarrhea in children under the age of 5	ND	39	12	33
Diarrhea prevalence in children under the age of 5	25%	12.2%	7.7%	15.1%
Under 5 mortality	2.2%	0.6%	1.9%	2.7%
Proportion of mortality due to diarrhea	0%	0%	50%	100%
Percentage of vendors having discussions with sensitizers	ND	67.3	ND	86.9